THE ARTS IN EDUCATION, A POSSIBLE KEY TO WHOLE BRAIN UTILIZATION AND POSITIVE SELF-CONCEPT

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by

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An Abstract of a Dissertation by
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The problem. Questions to be Answered. (1) Is there a relationship between self-concept and curricular involvement in the arts? If so what is the direction of that relationship? (2) Is there a relationship between cerebral dominance and curricular involvement in the arts? If so what is the direction of that relationship? (3) Is there a relationship between cerebral dominance and self-concept? If so what is the direction of that relationship?

Procedures. Subjects were sixty volunteers from specially chosen curricular areas of students at several midwestern colleges. The students' curricular areas represent what is assumed to be those requiring linear (left cerebral) and creative (right cerebral) functioning by their nature. These choices were made in an effort to provide more lateralized subjects, for more concise data.

Participants were given a battery of tests suggested to determine self-concept and cerebral dominance.

Findings. This research did not find a significant difference between the self-concept of students involved in an arts curriculum and those involved in a fact oriented curriculum. This research did not find significant difference between the self-concept of students and their right or left cerebral dominance or orientation. This research did, however, find significant difference between the right/left cerebral dominance of students who were involved in arts vs. fact curriculum. The arts students excelled at right cerebral activities and the fact oriented students excelled in left cerebral activities.

Conclusion. This research supports past research which shows a relationship between student curricular involvement and cerebral lateralization.

Recommendations. It is recommende . that instruments be developed to better measure cerebral lateralization of activity as well as balanced activity. It is further recommended that future research in this area include a sample which is balanced in the several areas of the arts and in male/female members.

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CHAPTER ONE

Statement of the Problem

The major purpose of this study was to determine the relationship among right cerebral brain functioning, self-concept and involvement in the arts.

The research questions stated as null hypotheses are:

Hypothesis 1: The means of self-concept scores for groups involved in a highly arts-oriented curriculum do not differ significantly from the means for groups involved in a highly fact-oriented, linear curriculum.

Hypothesis 2: The mean of the self-concept scores for individuals who show right cerebral lateralization does not differ significantly from the mean for those who show left cerebral lateralization.

Hypothesis 3: The mean of hemispheric preference scores (left to right lateralization) for individuals in highly arts-oriented curriculum areas does not differ significantly from the mean for individuals involved in a highly fact-oriented, linear curriculum.

Rationale

Recent studies have indicated that an emphasis on the arts in schools can cause students to learn better in other subjects.[1] Certain of the relevant literature suggests that a part of that gain is predicated on improved self-concept. If right cerebral activity is stimulated by involvement in the arts, still another question arises.[2] What is the relationship among the arts, right cerebral functioning and self-concept?

Western society tends to educate in ways which foster left brain development at the expense of the many unique experiences requiring capabilities which utilize right brain processing. The work of Galin, Ornstein, Smokler and Shevrin[3] among others supports this contention. More efficient brain utilization would appear to be enhanced if more effective use could be made of right cerebral activity.

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[1] David Rockefeller, Jr., ed. Coming to Our Senses (New York: McGraw-Hill Book Co., 1977), pp. 278-93.

[2] Michael Andrews, "The Consonance Between Right Brain and Affective, Subconscious and Multi-Sensory Functions," The Journal of Creative Behavior, 14 (1980), 77-87.

[3] David Galin, "Implications for Psychiatry of Left and Right Cerebral Specialization," Archives of General Psychiatry, 31 (1974), 572-83; Robert W. Ornstein, ed., The Nature of Human Consciousness (San Francisco: W. H. Freeman, 1973); I. A. Smokler and Howard Shevrin, "Cerebral Lateralization and Personality Style," Archives of General Psychiatry, 36 (1979), 949-54.

This study examines the belief that the arts improve general learning, as previously suggested by other studies.[1] Beyond that it examines the specific rationale that a part of that improvement is based upon cerebral lateralization and self-concept. If an involvement in the arts improves not only learning, but self-concept and a greater cerebral utilization as well, this would suggest that schools should take a longer, more serious look at the value of the arts in curricular programs.

Assumptions

Several tests were used to establish data for this research. Seven tests were administered to each subject. Five instruments were used to determine right/left cerebral dominance and two to determine self-concept. These instruments were suggested by two clinical psychologists for this purpose. They are instruments used and investigated by the psychologists (see Data and Instrumentation). Information related to use of these instruments and past utilization also suggested that they were appropriate (see Data and Instrumentation). This researcher, therefore, assumes that the tests used measured what they were utilized to measure.

Students who served as subjects for this research

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[1] Rockefeller.

were chosen from the curricular areas of math, law, dance, and art. It is an assumption of this researcher that these students were typical of the populations they represented. It is further assumed that the questionnaire administered to identify current curricular involvement further separated students in arts curriculum from students in linear, fact oriented curriculum.

Limitations

There were a number of limitations inherent in the study from its inception. Volunteers from among the curricular areas mentioned above were difficult to obtain. The fact that no remuneration was offered participants for time (a two to three hour block) was a deterrent. Since all volunteers could not participate at the same time the testing conditions were not necessarily consistent. Most of the testing, however, was done in the same room, with conditions maintained as constant as possible.

Though assumptions were made concerning students involved in a college curriculum which was arts or fact oriented, the students could have quite possibly been involved in curriculum related to the converse orientation during the first twelve years of their formal education. It is quite possible for example that a math or law major may have spent twelve years in pursuit of the arts before coming to college. Such students would not, therefore,

have the strictly linear background assumed. The converse may also have been the case. Some persons currently majoring in pursuits assumed to be left or right cerebral oriented, accordingly could have been involved very deeply in the complementary pursuit before coming to college, or along with other current endeavors.

Law students were on the average considerably older than their counterparts in other curricular areas, because of their prerequisite requirements.

Another limitation or qualification of the study is the gender balance of the sample (see Appendix J). The literature on right and left cerebral lateralization often deals with gender. Some authors feel gender is an important aspect of hemisphericity. Some attribute right or left hemisphericity to one or the other sex. A number of authors concur that males are more lateralized and females less lateralized for cerebral functioning. Other researchers report that there are no differences.[1]

Gender has not been ignored in this study. The sample of sixty included thirty-five females and twenty-five males. This imbalance and its possible implications will be discussed in Chapter Five. Since twenty-two of our

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[1] Sally P. Springer and George Deutsch, Left Brain Right Brain (San Francisco: W. H. Freeman and Co., 1981), p. 126.

thirty arts sample were female (thirteen dance subjects and nine art subjects) can can see the rationale for the decision in this study. Eliminating appropriate numbers of females from each of our four sample groups to reduce the imbalance in the dance group (two males) would have depleted the sample, and destroyed the study. The decision was made, therefore, to accept the limitations of this imbalance.

Significance of the Study

There are a number of aspects of this study which are unique. A few of the most obvious ones are listed below:

1. Self-concept and curricular experiences (fact vs. arts oriented) are being examined on college level students.

2. Cerebral lateralization is being examined as it related to curricular involvement (fact vs. arts oriented) on college level students.

3. Self-concept is being investigated as it relates to cerebral lateralization in normal subjects, who are college level students.

This study faces directly a few factors which have been implied by other studies, and with other subjects as suggested above These factors have not been investigated to the researcher's knowledge. Data gleaned from such an investigation, therefore, are of interest to practitioners in the three areas involved.

Definitions

Academics. For purposes of this study the term academics refers to subjects taught in school which do not include the arts, physical education, etc., but which do include such subjects as math, English, science, history, etc.

Arts. Visual art, dance, drama, music, creative writing.

Arts Oriented Curriculum. A curriculum which involves a considerable amount of time on a regular basis devoted to one or more of the arts.

Axon. Long fiber leading away from the cell neuron; transmits nerve impulses to other neurons or to muscle or gland.

Cerebral Dominance. Condition of asymmetry of brain function by which competition between the cerebral hemispheres is avoided by the dominance of one controlling hemisphere.

Cerebral Hemispheres. The two halves of the brain, left and right.

Cerebral Specialization. The two cerebral hemispheres have specialized functions. The left hemisphere controls

speech, writing, and math calculations, while the right hemisphere controls perception tasks; also referred to as lateralization of function.

Cerebrum. A main division of the brain in vertebrates, consisting of two hemispheres.

Cognitive Shift. A transformation from one mental state to another, e.g., from L-mode to R-mode or vice versa.

Corpus Callosum. A massive, compact bundle of axons connecting the right and left cerebral cortices. The corpus callosum allows the two halves or hemispheres of the cerebral cortex to communicate directly with one another.

Creativity. The ability to find new solutions to a problem or new modes of expression; the bringing into existence of something new to the individual.

Data. Reports or measurements of observed events.

Fact Oriented Curriculum. A curriculum which includes basically materials which are factual and need to be memorized or learned instead of reasoned out or solved creatively.

Feedback. Process by which information about the correctness of previous responses under one's control returns to the individual's "control center" so that corrections

and regulations can be made where necessary to guide subsequent responses.

Functions. Operations.

Hemispheric Lateralization. See cerebral specialization.

Left Hemisphere. The left half of the cerebrum.

L-Mode. A state of information processing characterized as linear, verbal, analytic and logical.

Linear. For purpose of this study, narrow and uniform; one fact leading to another and so on in a precise fashion.

Right Hemisphere. The right half of the cerebrum.

R-Mode. A state of information processing characterized as spontaneous, holistic, spatial and relational.

Self-Concept. For purpose of this study self-concept will be defined as: A person's perception of his or her own continuing identity or self-esteem as an individual, as measured by instruments used in this study.

Split-Brain Patients. Individuals who have been suffering from intractable epileptic seizures whose medical problems were relieved by a surgical operation. The

procedure separates the two hemispheres by severing the corpus callosum and is rarely done. This surgery, however, is the basis for much of the current theory related to brain lobe specialization.

CHAPTER TWO

Related Literature

The literature from the separate areas of self-concept, involvement in the arts, and cerebral dominance does not show much regarding interrelationship among them. It does, however, imply enough to warrant further study. Furthermore, it implies the importance of the separate factors in the education of young people.

This chapter will describe briefly sources for some of the relationships which appear to exist, beginning with a brief rundown on the history of brain research.

The Beginning of Lateralization Studies

Vital to any study which considers lateralization of the brain are experiments which began with the first corpus callosum surgery on a human being in 1961 at the California College of Medicine and which were done in hopes of curing severe epilepsy. The corpus callosum is a massive bundle of axons connecting the right and left cerebral cortices or hemispheres. The corpus callosum allows the hemispheres of the brain to communicate with each other. The separate hemispheres apparently have separate specialized functions. Separation, in this case, by severing the corpus callosum was performed originally in a specific attempt to correct seizure problems of an epileptic, as were ten others

between 1961 and 1967. There was an added benefit, however, when it was found that the patients also provided an excellent set of subjects for the study of cerebral specialization. This was true because the separation allowed the functions of the separate hemispheres to be isolated and studied separately.

The studies initially undertaken by Roger W. Sperry of the California Institute of Technology uncovered data stated briefly in these quotations from Richard D. Koniceks' article in Phi Delta Kappan:

> The left hemisphere seems to be the site of logical analytical, linear, propositional thought. The right hemisphere is the locus of visuospatial and appositional thought and imagination.[1]

Self-Concept and Cerebral Functioning

This writer was fortunate to visit with Don Tucker, of the University of North Dakota, concerning research he and co-workers have undertaken in this area. Dr. Tucker provided the author with an unpublished study, "Lateralized Cognitive Style and Self-Description," which he co-authored with Steven Dawson and Rodney Swenson.[2] In the study and

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[1] Richard D. Konicek, "Seeking Synergism for Man's Two Hemisphere Brain," Phi Delta Kappan, Sept. 197[illegible], pp. 37-39.

[2] Steven L. Dawson, Don M. Tucker, and Rodney A. Swenson, "Lateralized Cognitive Style and Self-Description Bias," unpublished study, Univ. of North Dakota, 1982.

in conversations with Tucker, he suggests that a positive relationship exists between self-concept and brain functioning. Right brain lateralized subjects seemed in studies undertaken by this group to have more positive self-concepts. Tucker in conversations with this writer, indicated that the preconceived notions might lead one to believe that persons favoring concrete sequential thinking (left-brain mode practitioners) might be more self-assured than right-brain mode practitioners. Dawson et al., however, point out that the findings in their research replicate the findings of D. M. Bear and P. Fedio in their experimentation with epileptic patients.[1] In their paper Dawson et al sum up the actual observations in this way:

> A more restricted, self-critical bias in self description would seem consistent with the more tightly structured cognitive organization of the left hemisphere, while one might expect a more expansive and uncritical self-report to be associated with a preponderance of right hemisphere conceptualization.[2]

Their findings were based upon the use of a large number of instruments, some requiring complex, professionally administered evaluation. Use of the electroencephalograph (EEG) evaluation instrument, for example, would be unlikely outside of the psychology clinic setting.

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[1] D. M. Bear and P. Fedio, "Quantitative Analysis of Interictal Behavior in Temporal Lobe Epilepsy," Archives of Neurology, 34 (1977), 454-67.

[2] Dawson, p. 19.

Self-Concept and Education

Some research suggests that high self-concept improves learning, or conversely that positive learning situations improve self-concept.[1] The two are reciprocal and complementary, and both are very much related to this study. Persons who feel good about themselves "are more persistent and able to assume more responsibility--stay with tasks longer and prefer self-designated tasks"; in short, high self-concept persons have many qualities important to learning.[2] These persons are more likely to "follow through on their commitments," with "minimal need for supervision."[3] Positive learning situations, however, as shown in the author's own research can affect positive self-concept changes as well.[4]

Some authors point to adaptability as an aspect of self-concept or self-esteem. John Scherer at Whitworth College in Spokane, for example, suggests that "how a person adapts to his or her environment" has a lot to do with "how

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[1] Shirley Griggs and Gary E. Price, "Self Concept Relates to Learning Style in the Junior High," Phi Delta Kappan, Sept. 1980, p. 604.

[2] Ibid.

[3] Ibid.

[4] Carol Fox Druart, "The Effect of Positive Reinforcement Upon Self-Concept in a Junior High Classroom," Thesis, Drake Univ., 1975.

high one's self-concept is."[1] The ability to deal with ambiguity or inconsistency is also considered by some to be related to self-concept.[2] These components appear to be aspects of successful learning experiences. They also are considered to improve one's right brain utilization.[3]

Education and the Arts

Several schools have tried experiments with educational programs in which the whole school curriculum was based on the arts. Less time was spent upon teaching of the "academic" classes, and more time was given to the arts. There is no record of students' "academic" achievement dropping, and there are a number of cases where achievement was much improved.

> John Melser, principal of P.S.N. 3 in Manhattan, an alternative school which has made the arts central to its program, sums up his observations on the subject in this way. "One can expect from an arts-based curriculum a small but fairly certain increment in the rate of development of basic skills, together with the development of a degree of confidence, self reliance, resourcefulness, and willingness to work through difficulties, which helps the child become a more self-motivated and efficient learner.[4]

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[1] John J. Scherer, Job Related Adaptive Skills: Toward Personal Growth (n.p.: University Associates, 1976), pp. 152-56.

[2] Robert Samples, "The Intuitive Mode: Completing the Education Process," Media and Methods, 11 (1975), 24-27.

[3] Ibid.

[4] Junius Eddy, "Art Education: The Basics and Beyond," Art Education, Nov. 1977, p. 6.

In his article, "Art Education: The Basics and Beyond," Junius Eddy wrote about programs which have experimented successfully in improving other areas through the use of the arts. The Guggenheim Museum's Reading through the Arts program in New York City and the "Open Door Program" in New York's Community School District No. 4, in Spanish Harlem, have both recorded reading score gains in participating students over non-participants."[1]

The Interdisciplinary Model Program in the Arts for Children and Teachers (IMPACT) studies, which have gone on for many years in several parts of the country, point to data which indicate that schools that are based in the arts curriculum can and do teach reading, mathematics and other subjects effectively.

> After 4 years of Arts IMPACT the number of 6th graders with reading vocabulary above grade level rose 65%, arithmetic computation, 56%, arithmetic concepts 63%, reading comprehension 41%, arithmetic application 25%.[2]

It has also been suggested that side effects of teachers' attitudes and excitement about what they are doing was very much improved.[3]

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[1] Ibid.

[2] Stephen M. Dobbs, ed., Arts Education and Back to Basics (Reston, Va.: National Art Education Assoc., 1979), p. 136.

[3] Ibid.

Self-Concept and the Arts

The inner-relatedness of the several variables under consideration is sometimes apparent in the literature, sometimes vague. In the quotation above one can hardly avoid the consideration, for example, that the arts may have improved self-concept which in turn produced the resulting improved achievement. Perhaps the teachers' attitudes, on the other hand, caused a rise in self-concept generated by more positive teaching techniques.

This writer's own study in an inner-city junior high school suggested that visual arts, properly taught, are a help in learning problem solving and gaining positive self-concept because of many solutions being acceptable even though they are unique and different from each other.[1]

> It is because the arts reveal the particular qualities of each student that the focus is not on what he is as one of many, but who he is as one of a kind.[2]

Right-Left Hemispheric Data and Neuropsychology

A brief description of the relationship of hemispheric dominance data and neuropsychological data may help to clarify the rationale for utilization of the latter in this study.

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[1] Druart.

[2] D. Diamondstein, "The Role of the Arts in Education," Art Education, Nov. 1976, p. 10.

As suggested in Chapter One, much of right/left hemispheric dominance and utilization research has come out of research related to the malfunction of parts of the brain. In the case of the Sperry research, for example, the malfunctions were found in epileptics.[1] The area of that research and the topic of this study are related because it is now known what portions of the brain are responsible for which activities. Being able to identify which type of functions are disturbed helps to lead to the location of the brain damage. Conversely, we may make assumptions about functional difficulties knowing the location of the brain damage. The same reciprocal relationship exists in cerebral dominance situations, which is what lead to the topic of this research. Impairment of particular abilities can exist because of disfunction caused by organic or inorganic causes. Habitual use, or whatever causes cerebral dominance, is an inorganic cause.

The literature found in researching for this study examines different groups from the subjects used for this research. In some cases college students were used but they were not chosen by curricular area. In other cases epileptic patients were the subjects. The relationships examined by the hypothesis of the study are also different

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[1] Roger W. Sperry, "Left-Brain, Right-Brain," Saturday Review, Aug. 1975, p. 153.

from those done in the past. Certain implications for education suggested in the past research have suggested, however, that this research is worth undertaking.

CHAPTER THREE

Procedures

This chapter discusses the population and sample of the study as well as the rationale for their selection. The instruments used in evaluating participants are also described briefly. A fuller description of the instruments may be found in Appendices A through G. Chapter Three also describes instrumentation and analysis of data which are further described by information in Appendices following Appendix J.

Population and Sample

Subjects for this study were a non-random sample of sixty volunteers drawn from Iowa State University, Drake University, Minneapolis College of Art and Design and Simpson College. They were solicited from class groups seen in general as containing serious students in one of the following four curricular areas: law, math, visual art and dance. The sample is meant to represent college students involved in fact curricula or arts oriented curricula respectively. Rationale for choosing these curricular areas is explained later in this chapter.

Instructors or department heads in these departments allowed the investigator to present a call for volunteers in appropriate classes. The Student Solicitation Form,

which may be seen in Appendix H, expressed in print what the investigator said to prospective volunteers in these classes. Students were also given blank cards requesting the following data from persons interested in taking part in the research: name, address, telephone number, choice of testing dates or alternate dates if appropriate. Using this information the investigator could contact interested persons by phone or card to remind them of their scheduled date or to reschedule them. Some students were rescheduled numerous times.

Convenient testing dates and times were arranged and the battery of tests was administered. Testing dates and locations are listed below. If subjects requested results from the testing and research the results were mailed to them after the study was completed.

Table 1

Groups Tested Were

School	Art	Law	Math	Dance
Drake University	X	X	X	X
Simpson College	X			
Minneapolis College of Art and Design	X			
Iowa State University				X

In addition to the technique of soliciting students in actual classes, posters were hung in a variety of appropriate locations on campus. The poster suggested that students might learn more about themselves (by taking the tests) and help a graduate student with research at the same time. A list of college subject areas being sought and a telephone number were given.

Testing dates covered several months because of the difficulty in obtaining a sufficient number of volunteers.

Table 2

Testing Dates and Sites

School	Dates	Time
Iowa State Univ.	Nov. 15, 17, 1982	5 to 9 pm
Drake University	Feb. 2, 3, 9, 1983	3 to 6 pm
	Feb. 16, 17, 23, 1983	6 to 9 pm
	Mar. 2, 3, 23, 24, 1983	3 to 6 pm
	Apr. 3, 1983	10 to 1 am
Minneapolis Coll. of Art & Design	Feb. 11, 1983	10 to 1 am
Simpson College (Students Tested at Drake)	Feb. 9, 1983	3 to 6 pm

Students were often interested in research but found it hard to schedule testing because of job or school requirements.

Students from the curricular areas of math, law, dance and art were chosen as samples for this study in an effort to stratify the results. It was felt that the areas of math and law might contain more students who were left brain lateralized. It was also felt that the areas of art and dance might contain more students who were right brain lateralized, than would students chosen at random.

Data and Instrumentation

The subjects' curricular area was determined by a questionnaire. The questionnaire also obtained social security number (by which the samples were coded), addresses and other personal data. This questionnaire was given to students before they undertook the battery of tests. See Appendix I for sample.

The variable of right/left cerebral dominance or lateralization was measured by the use of the Mooney Closure Test, Hooper Visual Organization Test, Conceptual Level Analogy Test, Shipley Institute of Living Scale and the Trailmaking Test. Self-Concept variables were determined using the Tennessee Self-Concept Scale and the Psychological Screening Inventory.

These instruments are all in general use in psychological and educational testing. Information concerning norms, reliability and validity can be found in Appendices A through J.

Two clinical psychologists, Dr. Frankle and Dr. Zenian, were consulted. They advised the selection of the tests which were used.[1]

Analysis of Data

A t test was run to determine difference between means as follows:

1. The mean self-concept score for individuals involved in a highly arts oriented curriculum and for those involved in a highly fact oriented curriculum.

2. The mean self-concept score for individuals who showed right cerebral lateralization and for those who showed left cerebral lateralization.

3. The mean hemispheric preference scores for those individuals involved in arts and for those involved in fact oriented or linear curriculum.

Results will be examined for significance at the .05 level. In interpreting the computed probability the two tailed probability was used for obtaining the direction of the difference.

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[1] Allan Frankle, Personal Interview, Sept. 1982; Shahe Zenian, Personal Interview, Sept. 1982.

CHAPTER FOUR

Presentation of Data

This chapter presents the findings of the study. Each hypothesis is stated along with disclosures identified with it. Tables in the chapter present means and overview data, supported by more detailed tables in the Appendices.

Seven psychological tests were used to measure the variables. Those theoretically related to right/left cerebral dominance apply to both hypotheses two and three. Measures related to self-concept apply to both hypotheses one and two. In some cases, therefore, the same tables and data will be used as partial support for different hypotheses.

The hypotheses states the criteria of proof as being significant differences (.05 level) between means for groups measured on relevant variables. Since a number of instruments were employed for each variable, presentation of the data does not consist of assigning a single mean to each variable. The author has attempted, however, to present the results of applicable instruments for each variable.

First Hypothesis

Null Hypothesis: The means of self-concept scores for groups involved in a highly arts-oriented curriculum do not differ significantly from the means for groups involved in a highly fact-oriented, linear curriculum.

Curricular Areas and Self-Concept/Tennessee Self Concept Test

Hypothesis One deals with the relationship of self-concept to curricular involvement. As one examines the Tennessee Self Concept instrument (see Appendix F) two factors emerge: P, the total positive score, computed from a number of different components of the instruments; and SC, which in this case stands for self-criticism (see Appendix N, Tables 26, 27, 28 and 29). Means have been derived for both of these figures and a mean computed combining the two. This combination uses the self-criticism scale as a correction factor. The correction factor is used to reduce the discrepancy between what subjects write about themselves and what they really believe. In this case two times the SC (self-criticism scale score) was added to P.

Correction factors are used to adjust both of the self-concept instruments used in this research. They were suggested by Dr. Frankle, who has had many years of

experience in administering and evaluating instruments of this type. The reader may note that the raw scores and amount of the correction factor are also listed in Appendix N, Tables 26, 27, 28, and 29 and following in Table 3 with the means, as a point of information.

Table 3 shows the means of the various groups for the Tennessee Self Concept scores.

Table 3

Means of Curricular Groups Compared by Tennessee Self Concept Scores

Curricula	N	P	2 x SC	Adjusted Self Concept
Art	15	330.2	78.8	408.9
Dance	15	352.2	69.1	421.3
Arts Means	30	341.2	73.9	415.1
Law	15	352.9	75.5	428.0
Math	15	345.3	66.9	409.20
Fact Means	30	349.1	71.2	418.60

A complete listing of data excerpted for Table 3 can be found in Appendix N, Tables 26, 27, 28, and 29.

The total Art/Dance mean is 415.10 with a standard deviation of 43.07. Total Math/Law mean is 421.93 with a standard deviation of 29.69. The result of the t test for the difference between means is 0.70, which is not significant.

Curricular Area and Self-Concept/Psychological Screening Inventory, Self Concept Score

Examining the data derived from the Psychological Screening Inventory (see Appendix D), one discovers that a correction factor is appropriate, just as it was for the Tennessee Self Concept instrument. The correction factor in this case is called a defensiveness scale. Appendix N, Tables 26, 27, 28, and 29 show the scores for self-concept as presented by the PSI Self Concept raw scores as well as the corrected scores. Table 4 presents the means of those data.

Table 4

Means of Curricular Groups Compared by Psychological Screening Inventory Self Concept Scores

Curricula	N	PSI Self Concept	PSI Correction	Corrected PSI
Art	15	46.63	41.4	87.20
Dance	15	38.93	44.00	84.93
Arts Means	30	42.78	42.7	86.07
Law	15	34.07	49.4	84.73
Math	15	41.00	39.6	80.60
Fact Means	30	37.54	44.5	82.67
Total Sample Means		40.16	43.6	84.37

The correlation (Pearson r) between the PSI Corrected Self Concept Scores for the various curricular groups and the Corrected Tennessee Self Concept Scores are: Arts +.11 and Fact +.23. The total Art/Dance mean for the PSI is 86.07 and the total Math/Law mean is 82.67. The standard deviations are 15.20 and 15.23 respectively. The result for the t test of difference between means of pairs of groups is 0.85, which is not significant.

The data derived from the two self-concept instruments utilized for this study would not disprove the null hypothesis.

Second Hypothesis

Null Hypothesis: The mean of the self-concept scores for individuals who show right cerebral lateralization does not differ significantly from the mean of the self-concept scores for those who show left cerebral lateralization.

Based on psychological literature dealing with relative hemispheric dominance, it appears plausible that tests of spatial visualization and gestalt perception measure right hemisphere brain function; while tests of language, particularly vocabulary (for subjects with normal exposure to education) would reflect left hemisphere brain functioning. Dr. Frankle suggested that, of the spatial gestalt

measures, The Mooney Closure Test is representative and, of the verbal tests, The Shipley Vocabulary Scale would also be fairly typical.[1]

Establishing a Right vs Left Hemispheric Dominance Difference Score

The z scores (deviation from the total group mean) for the Shipley Vocabulary and for the Mooney Ratio scores were calculated for each participant, grouped by their curricular areas. (See Appendix M, Tables 22, 23, 24, and 25.) This procedure provided a deviation from the mean figure by which to more appropriately categorize samples as right or left hemispheric dominant. The z scores show the distance of the subject from the total group mean. The minus or plus of the z score indicates if the subject is below or above the mean for that instrument.

The most important step in this procedure, however, occurs in computing the difference score between the two z scores. This difference score indicates whether the subject's right or left z score is more dominant. (See Appendix M, Tables 22, 23, 24, and 25.) In this calculation the Shipley vocabulary z scores were subtracted from the Mooney Ratio z scores. The difference when negative indicates relative left hemispheric dominance. When

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[1] Frankle.

positive the difference score indicates relative right hemisphere dominance.

Other measures of right or left cerebral activity are used in this research. However, the single plus or minus score provided by the technique described above is a convenient and useful figure. More will be said later in this section about other right/left instrumentation.

Using the Difference Between Right/Left Dominance Scores to Compare with Self Concept Scores

In comparing the persons who scored highest in right or left cerebral dominance for use in testing hypothesis two, the Mooney/Shipley difference score was used (see Appendix M, Tables 22, 23, 24, and 25). The fifteen persons scoring the highest negative (relative left hemisphere) scores, and the fifteen scoring the highest positive (relative right hemisphere) scores (of the total subjects) were compared on the Psychological Screening Inventory and the Tennessee self concept corrected scores (see Appendix N, Tables 26, 27, 28 and 29). The self-concept scores of those two groups were recorded and the means determined (see Appendix Q, Tables 35 and 36). The results are summarized in Table 3 below.

Table 5

Right and Left Cerebral
Dominance Group Means

Mean z Dominance	N	PSI Corrected Self Concept	Tenn. Corrected Self Concept
+1.5	15	85.66*	412.2
-1.70	15	85.33*	419.2

* PSI higher scores only mean more maladjusted

The mean scores of 85.66 and 85.33 for the PSI and 412.2 and 419.2 for the Tennessee Self Concept show standard deviations of 15.3 and 17.6 respectively. The result of the t test for the difference between means was .053, which is not significant.

The instruments used for this research suggest that right and left cerebral dominant persons do not differ significantly in self-concept. Data collected in this research therefore indicate that the second null hypothesis stands.

Other Instruments Used to Evaluate Right vs Left Hemispheric Dominance

As suggested earlier in this section, a number of instruments were used to evaluate right/left cerebral dominance which are addressed in both hypothesis two and hypothesis three. All of those instruments will be

discussed in this section for referral as the reader goes on to hypothesis three.

Results of the Conceptual Level Analogy Test

The Conceptual Level Analogy Test was used in this research as a left cerebral dominance instrument. The test seemed, because of its verbal nature, to fall into the left hemispheric realm. In this researcher's experience, however, the instrument did not discriminate between groups. All group means were similar. The CLAT as well as the Shipley Vocabulary scores showed the mean intelligence of all four groups to be high, however.

The CLAT raw score curricular group comparison showed means of: Art 29.93, Dance 30.73, Law 31.73 and Math 29.06. These differences were not significant (see Appendix L, Tables 18, 19, 20, and 21).

This investigator then attempted to find if there would be significant spread by computing a ratio. The ratio of number correct to time in minutes (taken to complete) was computed by dividing the time into the number correct. Means of results of this computation are shown in Table 6.

Two examinations of the CLAT data were made. One involved the means for the number correct and the second involved the Ratio of the number correct divided by the

time in minutes (ratio). (See Appendix L, Tables 18, 19, 20, and 21.)

Table 6

Group Means for CLAT Score/Time in Minutes Ratio

Curricula	N	Mean # Correct	Time in Minutes	Ratio
Art	15	29.93	10.93	2.97
Dance	15	30.73	11.46	2.88
Arts Means	30	30.33	11.20	2.93
Law	15	31.73	13.7	3.06
Math	15	29.06	11.66	2.66
Fact Means	30	30.40	12.68	3.86
Total Sample Means	60	30.37	11.94	2.90

The means for the number correct were: Art/Dance 30.33, Law/Math 30.40. The result of the t test for the difference of means was 0.07 which is not significant.

The means for the ratio were: Art/Dance 2.93, Law/Math 2.86. The result of a t test for the difference of means was 0.258 which is not significant.

Because the data explored in the CLAT investigations did not differentiate between total groups it was not used as a left cerebral instrument in computing differences.

Communication during the process of the research with the author of the CLAT, Dr. Allen Willner, presented further rationale for not using the data in the way it was originally planned (see Chapter Five).

Results of the Trailmaking Rest Parts A and B

The Trailmaking Test (see Appendix G) was used in an effort again to ascertain right/left cerebral utilization. Appendix J, Tables 10, 11, 12, and 13 present group comparison data for the two instruments.

Trailmaking A, because of its spatial emphasis, was used as a right cerebral instrument and Trailmaking B, because its somewhat more complex alternation of numbers and letters requires sequential flexibility, was used as a left cerebral instrument. The reader should also be reminded that the score for TMT A and for B is the time in seconds taken to complete each trail.

Again this test was suggested by Dr. Allan Frankle for use in this research, based on the reports by Dr. Ralph Reitan[1] that performance on the two parts is differentially affected by left vs right hemisphere brain damage.[2]

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[1] Frankle, Sept. 1982.

[2] Ralph M. Reitan and Leslie A. Davison, eds., Clinical Neuropsychology: Current Status and Applications (Washington, D.C.: V. H. Winston and Sons, 1974), p. 101.

Table 7 presents means of the group comparisons, and the establishment of a difference score. Appendix J, Tables 10, 11, 12, and 13 provide more detail.

Table 7

Right/Left Cerebral Instruments Compared

Curricula	N	Trail A	Trail B	Difference
Art	15	31.6	57.2	-25.6
Dance	15	50.33	69.9	-18.73
Arts Means	30	40.96	63.53	-20.99
Law	15	32.06	62.3	-31.73
Math	14	28.92	51.4	-20.99
Fact Means	29	31.24	51.55	-26.36
Total Sample Means	59	36.10	57.29	-23.68

The Trailmaking A and B instruments produced an unusual picture of the sample. On these instruments the Dance group did inordinately poorly. The Dance group mean score of time in minutes to complete the instruments was 18.29 and 15.52 minutes longer than the mean of the other groups, for parts A and B respectively. This result skewed the results of the arts vs fact comparison, though the art

group average was only .36 and 5.65 minutes higher than the fact combined group mean on the two instruments.

A subject was also removed from the math sample because the times were apparently mistakenly recorded.

The Trailmaking A means were Art/Dance 40.96, Law/Math 31.24. The result of the t test for the difference of means was 2.873 which is significant at the .01 level.

The Trailmaking B means were Art/Dance 63.53, Law/Math 51.55. The results of a t test for the difference of means was 0.940 which is not significant.

Because of the problems related to this comparison and because of data concerning the Trailmaking instrument as a R/L cerebral instrument which will be described later, it was decided not to consider the results of these instruments.

Third Hypothesis

Null Hypothesis: The mean of hemispheric preference scores (left to right lateralization) for individuals in highly arts-oriented curriculum areas does not differ significantly from the mean hemispheric preference scores for individuals involved in a highly fact-oriented, linear curriculum.

The data related to hypothesis two presented results which will be used to test hypothesis three as well. Several instruments were tried for which data has been presented in the section related to hypothesis two. These data are related to: The Shipley/Mooney Difference Score, The Conceptual Level Analogy Test, Trailmaking Test A and B, and the Hooper Visual Organization Test. All of these instruments were used in an effort to determine a right/left cerebral dominance score. The reader is advised to refer to the previous section for that information.

Examining the Hooper Ratio Ratio Related to Hypothesis Three

Examining the Hooper Data one finds a number of interesting relationships (see Appendix K, Tables 14, 15, 16, and 17). Subjecting the Hooper Ratio to a t test for the differences of group means the following data emerge:

Art/Dance t=2.864 significant below .01 level

Art/Math t=2.779 significant at .01 level

Art/Law t=2.188 significant at .05 level

Referring specifically to the third hypothesis and comparing the Arts and Fact group means, one finds the following:

Art/Dance mean 7.032, std. dev. = 3.027

Law/Math mean 6.068, std. dev. = 1.846

t = 1.425 which is not significant

Though the data from the Hooper Ratio comparison are not significant for hypothesis three, they show significant differences between some of the component groups: Art/Law (.05); Art/Math (.01); and Art/Dance (.01). It should be noted that when using the number correct score alone without taking time into account, significant differences did not emerge. See information in the last section and in Chapter Five related to Hooper data.

Utilizing the Shipley/Mooney R/L Difference Score to Compare Curricular Groups

The final comparison to be considered for hypothesis three is a comparison among groups related to right/left cerebral dominance which utilizes the Shipley/Mooney Difference Score, introduced under hypothesis two. This score, it may be recalled, is a difference between z scores of the Mooney (right cerebral) instrument and the Shipley (left cerebral) instrument. Because the difference was arrived at by subtracting the Shipley z from the Mooney z a difference which is positive indicates right hemisphericity and negative difference scores indicate left hemisphericity.

Appendix N, Tables 26, 27, 28, and 29, presents data related to the above comparison. The tables present the Mooney and Shipley z scores and the difference score. The difference score for the Mooney is calculated from a

z score derived from the square root of the number correct. This number is divided by time in minutes to complete the test, which provides us with the ratio. The z score for the Shipley was computed from the number correct raw score.

The difference was significant for the Mooney Closure scores and the Shipley Vocabulary score means for the various curricular groups. The Shipley/Mooney, R/L Difference Score means for the curricular groups were also significant. A number of comparison results are summarized below.

Using Only the Shipley Vocabulary Scores to Compare. Comparing the Art/Dance and Law/Math groups using the Shipley Vocabulary Scores one finds: the result of a t test for the difference of means of 2.095 which is significant at the .05 level. The Law/Math group excels over the Art/Dance group on vocabulary scores.

Using Only the Mooney z Scores to Compare. Comparing the Art/Dance and Law/Math groups using the Mooney z scores one finds the results of a t test for the difference between means to be 3.132 which is significant at the .01 level.

Using the Difference Score to Compare. Utilizing the difference score as derived above (see Appendix N, Tables

26, 27, 28, and 29) one finds the result of a t test for the differences between means to be 3.132 which is significant at the .01 level.

Data brought forth from these comparisons, therefore, indicate that null hypothesis three is false and it is rejected.

Art/Dance students excel significantly in Right Cerebral performance. Math/Law students, on the other hand, excel significantly in left cerebral performance, as shown by these instruments.

Reviewing the data presented in this chapter, one finds null hypotheses one and two stand and null hypothesis three is rejected. Discussion, conclusions and suggestions related to these findings are found in Chapter Five.

CHAPTER FIVE

Summary, Discussion and Conclusions and Recommendations

This study examines midwestern college students, for the relationship between their curriculum involvement, their cerebral dominance and their self-concepts. The study has been undertaken because of a body of information which suggests the importance of the arts in education. Another important aspect of the investigation is the importance of full brain utilization.

In his article for Human Nature, "The Split and the Whole Brain," Robert Ornstein sums up the educational challenge in this way:

> Split-and whole-brain studies have led to a new conception of human knowledge, consciousness, and intelligence. All knowledge cannot be expressed in words, yet our education is based almost exclusively on its written or spoken forms. We seem unable to expand our ideas of education and intelligence, perhaps because we have no way to measure such progress. But the artist, dancer, and mystic have learned to develop the nonverbal portion of intelligence. . . . If we can extend this notion of our own educational system, perhaps we can begin to train our diverse capacities for synthesis and for comprehensive understanding. Our schools offer an education for half our minds, and it is time to reinstate a balance.[1]

This researcher feels that perhaps self-concept is

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[1] Robert Ornstein, "The Split and Whole Brain," Human Nature, 1 (1978), 83.

related to these variables. Other studies seemed to encourage that point of view. Research of Don M. Tucker of the University of North Dakota, is a case in point.[1] The combined variables of the arts, self-concept and right/left cerebral dominance have not been previously examined to the knowledge of this researcher.

Seven instruments were used to evaluate the variables of self-concept and right/left cerebral functioning. This chapter presents results from all, even though data revealed by two instruments indicated that their results were not relevant.

In discussing findings the author will follow an order based upon the initially stated null hypotheses. The findings will first be reviewed in summary. Then, respectively, conclusions and recommendations will be offered.

Summary

Data examined for the relationship of self-concept to curricular involvement failed to disprove null hypothesis one. The null hypothesis stood, because the mean scores for the PSI and The Tennessee Self Concept instruments on the combined groups of Art/Dance vs Law/Math were not significantly different. This indicates that as far as this

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[1] Dawson, Tucker, and Swenson; Don M. Tucker, Personal Interview, Dec. 1981.

research is concerned, the self-concept of students involved in highly arts related curriculum does not differ significantly from the self-concept of students involved in a highly fact related curriculum.

The same self-concept instruments and data were used to study groups which differ in right/left cerebral dominance. These variables were measured by the Right/Left Cerebral Dominance Difference Score, described in Chapter Three.

The second null hypothesis also remained intact. No significant difference was indicated between the means of the self-concept instruments for right dominant versus left dominant groups. This indicates that as far as this research is concerned the fifteen top scoring right-dominant persons and the fifteen top scoring left-dominant persons were not significantly different from each other in mean self-concept scores.

Five instruments were used to provide data concerning right/left cerebral dominance. The author was not familiar with any tests which are easily administered in a classroom setting specifically designed to test R/L cerebral dominance. Dr. Frankle was helpful in suggesting appropriate tests.[1]

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[1] Frankle, Sept. 1982.

Instruments used that are thought to be sensitive to right hemisphere cerebral functioning were the Hooper Visual Organization Test and the Mooney Closure Test. As suggested in Chapter Three, the results of the Hooper failed to show significance in discriminating between groups.

Results of the Mooney did differentiate between the Art/Dance group and the Law/Math group at the .02 level, favoring the Art/Dance groups. This disproves hypothesis three by demonstrating a clear superiority in right hemisphere power for the Art/Dance groups.

Instruments chosen which were thought to be sensitive to left cerebral dominance were the Shipley Institute of Living Scale and the Conceptual Level Analogy Test. The CLAT failed to discriminate significantly between groups.

The Shipley Vocabulary Test showed a significant mean difference between Art/Dance groups vs Law/Math groups at the .05 level, demonstrating superiority of left hemisphere power for the Law/Math group.

Scores on the Mooney, representing right hemisphere strength, and on the Shipley Vocabulary, representing left hemisphere strength, were transformed into z scores and the right minus left differences computed. This combined score derived from two independent measures of hemispheric power showed a mean difference between the Art/Dance vs

Law/Math groups significant below the .01 level. The combination even more clearly disproves hypothesis three.

This indicates that in terms of this research Art/Dance groups are superior to Law/Math groups on right cerebral activities. Further, this research indicates that Law/Math groups are superior to Art/Dance groups on left cerebral activities. These findings confirm findings in previous research.[1]

Though the research undertaken failed to disprove the first two null hypotheses, the third null hypothesis was disproved.

Investigation undertaken of hypotheses one and two provided a store of data which the author feels deserves more attention.

The ability of the Mooney/Shipley Difference Score to differentiate between right and left cerebral activity was one of the most meaningful aspects of the study. It is intended to pursue further implications of this score with other groups.

Results of the Hooper Visual Organization Test, which did not discriminate significantly between groups, were not surprising to the researcher. Dr. Frankle had advised that the instrument might be too easy to differentiate

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[1] Ornstein, "The Split and Whole Brain," p. 83.

between bright subjects.[1] As the test was available, however, and could be quickly administered, it was decided to use it on the chance that scores which included a time factor might differentiate groups. Because of the surface similarity to the Mooney it was planned to check the correlation between these two spatial tests. The Hooper, though sensitive to some types of brain damage, failed to discriminate between bright, normal subjects.

The Psychological Screening Inventory and the Tennessee Self Concept Test used as self-concept instruments demonstrated at least moderate agreement. The correlation between them was -.53. This negative correlation exists because the higher score indicates most maladjustment for the PSI, and the lower score the most maladjustment for the Tennessee. Dr. Shahe Zenian, who suggested the TSCT, says that it seems more sensitive than any other instrument he knows for measuring that elusive variable.[2]

Discussion and Conclusions

Discussion and Conclusions Related to Instrumentation

Retrospectively, some instruments utilized in this research may not have been as appropriate for the purpose

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[1] Frankle, Sept. 1982.

[2] Zenian, Sept. 1982.

as desired. Yet, considering the necessity for paper and pencil instruments which were to be evaluated primarily by a lay-person, and considering the information available to Dr. Frankle, who recommended most of them, and to the author at the time of their choice, they were deemed acceptable.[1]

Following are a few observations related to the separate instruments utilized:

A book published this year, after testing was completed, includes a very clear statement placing doubt on the use of the Trailmaking Test to measure cerebral lateralization. Muriel Lezak in Neuropsychological Assessment says "The lack of agreement between these studies makes use of this test to lateralize a lesion highly questionable."[2] As pointed out in Chapter Two, lateral-localization of cerebral lesions and identification of lateral dominance in normals are related but not identical processes. The first involves detection of the focus of pathological functioning, while the second measures which hemisphere dominates central processing.[3]

The Lezak statement does not, of course, deny the fact

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[1] Frankle, Sept. 1982.

[2] Muriel D. Lezak, Neuropsychological Assessment, 2nd ed. (New York: Oxford Univ. Press, 1983), p. 358.

[3] Tucker.

that some researchers still feel use of the Trailmaking test to lateralize lesions is appropriate.[1] On the other hand this research does support the Lezak statement. This opinion is based upon the fact that the instrument fails to discriminate between the arts oriented and fact oriented groups, and because of the lack of correlation between the Trailmaking and other instruments.

Concerning Willner's Conceptual Level Analogy Test, the instrument did not discriminate between groups. The use of the test as a left cerebral instrument seemed quite plausible, taking into account its verbal nature.

In personal conversation between Dr. Allan Frankle and Dr. Allen Willner, the author of the CLAT, after the results of this research were known, clarification was achieved. Dr. Willner explained that thought it is sensitive to diverse types of brain dysfunction, regular use of the instrument indicates that it is almost equally sensitive to left or right hemisphere brain damage.[2] Dr. Willner's statement supported the decision not to use the CLAT data in the R/L dominance context.

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[1] Lezak, p. 558.

[2] Frankle, June 1983.

Discussion and Conclusions Related to Gender Imbalance

As suggested in Chapter One, the gender of subjects in this study was a variable which could not be controlled, given the sample population available. The decision to include dance as one of the two arts groups probably more than any other factor determined the gender content (two males in a sample of fifteen).

The researcher, in addition to accepting the limitation, wished to report briefly on two observations made which relate to gender in this research. Possible distortion in the research caused by gender imbalance might be related to the belief of some persons that there is a difference in right/left cerebral functioning which is sex related. This distortion was not a factor of the current research. When, in an effort to study right and left lateralized persons, the researcher selected the fifteen persons who scored most highly lateralized for right cerebral functions, they consisted of eleven females and four males. Among the fifteen persons who scored most highly lateralized for left cerebral functions there were ten females and five males. The discovery that the gender balance was almost identical may have some implications for gender, but it would not appear to be responsible for any skewing, since nearly equal numbers of females fell into each category.

The second gender related observation concerned total sample. There were thirty-five females in the study, eighteen were right lateralized and seventeen were left lateralized. This, as the reader may observe, is nearly an even split, and again indicates that the gender inbalance may not be a threat to the R/L cerebral dominance balance of this study.

General Discussion and Conclusions

According to data presented in this research there are no significant differences between college students involved in a highly arts oriented curriculum and those involved in a highly fact oriented curriculum with respect to self-concept. There is also no significant relationship between self-concept and right/left cerebral functioning. There are, however, a number of significant factors concerning the relationship among those groups related to right/left cerebral functioning.

What is not apparent, and a far more elusive variable, is whether it is the arts which induce the right hemisphericity, or the converse. This chicken/egg dilemma may never be resolved. A long term study or a follow up study might be revealing, if it was begun with very young subjects.

Recommendations

Probably most research raises more questions than it answers. Perhaps this is its most important function. A few recommended future procedures suggested will be addressed by this researcher. It is hoped that others will be approached by other researchers and educators.

A. Data collected in this research should be examined in the following ways:

   1. Randomly select a sub-sample of the subjects used for this research which includes a balance of arts/fact and male/female to examine for self-concept and cerebral function scores to examine interaction.

   2. Examine data on subjects with high scores on both right and left cerebral instruments and compare with those having low scores on both right and left cerebral instruments in relation to their self-concept scores.

B. Instruments should be developed and used to evaluate right and left cerebral functioning and balanced cerebral functioning.

   1. These data should be made available to educators, parents and to the persons themselves, just as other strengths and weaknesses are.

2. Results of this testing should be compared to general educational success, relative educational success in different subject areas and other life adjustment criteria.

C. Further research should be done in areas which were touched upon but not resolved in this research:

1. Further experimentation should be done with the R/L Difference Score developed for use in this research to examine students across genders, age levels, curricular areas, and self-concept statuses.

2. The effects of self-concept on learning should be pursued in research which considers learning styles, R/L Cerebral Dominance, and Adaptability.

3. Further research should be done which considers the R/L cerebral dominance and self-concept factors but which includes equal numbers of males and females among samples.

4. Arts/cerebral dominance research should include equal numbers of males and females and an arts sample which includes Drama, Music and Creative Writing in addition to the Visual Arts and Dance.

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Appendixes

Appendix A

Conceptual Level Analogy Test

Conceptual Level Analogy Test

This test, developed by Allen E. Willner, Ph.D. is a paper and pencil multiple choice analogy test. It contains forty-two items. The test, key and norms were obtained directly from their author by Dr. Allan Frankle, for his use as a clinical psychologist. Scaled score equivalents of raw scores for the CLAT and several other instruments in common use, are available in Appendix O.[1] These norms were established in 1971 at Lackland Airforce Base. The test was standardized on a sample of seventy-five male airmen and seventy-five female WAFS. Standard scores were constructed on the model of WAIS scaled scores with the mean set equal to 10, and standard deviation to 3.

The corrected split-half reliability (odd vs even items) is 83.[2]

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[1] Allen E. Willner, Conceptual Level Analogy Test Key and Norms (New York: Cognitive Testing Service, 1971).

[2] Allen E. Willner, et al., "Analogical Reasoning and Post Operative Outcome," Archives of General Psychology, 33 (Feb. 1976), 235.

Appendix B

Hooper Visual Organization Test

Hooper Visual Organization Test

This test presents the subjects with drawings of simple objects which have been cut into several parts and rearranged on the paper. The task is to name the object. No time limit is used. The test usually takes about ten to twenty minutes.[1] In administration of this test for purposes of the research at hand it was decided to use the time for completion as the scoring criterion.[2] This technique is commonly used as is described in "Neuropsychological Assessment" as a discrimination technique for "low ceiling" instruments.[3] The term "low ceiling" is used by Lezak to describe instruments which are accomplished easily by "normals."[4]

Though the Hooper Visual Organization Test is used to determine certain kinds of brain function diagnosis it is especially suited for the purpose at hand. The test identifies not only which portion of the brain may have impairment which is organic, but also which portion is least utilized because of dominance of the other portion.

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[1] H. Elston Hooper, The Hooper Visual Organization Test Manual (West Los Angeles, Calif.: Western Psychological Services, n.d.), p. 4.

[2] Ibid., p. 6.

[3] Lezak, p. 151.

[4] Ibid., p. 159.

When the term "normals" is used as it was above, it is meant to differentiate from persons who have psychological difficulties or who are under treatment.

Norm data in the manual indicates the range for normals and mildly impaired is 20.0 to 30.0 and for moderately impaired drops to 10.0. Four groups of seventy male veterans were used to determine these standards. Statistical analysis of data including an analysis of variance determined a significant difference among the groups at the 3.05 level. It is suggested that a cut off of 20.0 eliminates any mis-diagnosis.[1]

Reliability of the instrument has been studied on two normal groups. One study used 166 college students and the correlation between split-halves of this test was determined as 1. After correction by the Spearman-Brown formula, the correlation was +.82.[2]

Validity studies based upon normals at various age ranges indicate 3 percent false diagnosis. The namual states, however, that a cut off point of 20.0 eliminates any positive false diagnosis.[3]

Since the kinds of dysfunctions of subjects who are

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[1] Hooper, p. 4.

[2] Ibid., p. 9.

[3] Ibid., p. 6.

not "normal" are not classified as to hemispheric location as they might be in neuropsychological data, these data are not as useful to the reader as statements from neuropsychological data concerning current use of the Hooper.

In Lezak's "Neuropsychological Assessment" she says "For example, Elithorn's Mazes and Hooper's Visual Organization Test examine visuoconceptual functions."[1] In another citation from Lezak she says "the Hooper Visual Organization Test" is used "primarily to examine reasoning and perceptual organization in the visual modality."[2] Lezak cites numerous test batteries in which the Hooper is used to test these phenomena.[3]

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[1] Lezak, p. 151.

[2] Ibid.

[3] Ibid., p. 159.

Appendix C

Mooney Closure Test

Mooney Closure Test

The test consists of a booklet of forty-four pages in length. Each page contains a picture which is in some way incomplete. They are confusing at first because in some, lines and shapes have been left out. Other "bits" may have been added so that at first one may not see the image clearly, and indeed some never do. There is a real object in each picture. Unlike projective tests, they are not just shapes for one to use one's imagination about, but images of real things.[1]

Subjects respond by listing on a separate sheet of paper what they believe they have seen. It is suggested that subjects average no more than one minute per item, but they are allowed the time they need and simply record beginning and ending times for the entire test.[2]

The test scoring manual gives a list of acceptable and commonly given unacceptable answers. Answers not on the acceptable list are unacceptable and counted wrong.

"The present closure test is a development of a test first created and used by R. F. Street (1931), and referred to by him as a Gestalt Completion Test."[3] It is designed

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[1] C. M. Mooney, "Closure Test Instructions for Administering and Scoring," unpublished manual, n.d., p. 2.

[2] Ibid.

[3] Ibid., p. 1.

to measure what L. L. Thurstone (1944) identified as "speed and strength of closure."[1] Additionally this test examines the ability to form a "closure against some distraction."[2]

Some items in the Mooney Closure Test seem sufficiently difficult to provide challenge to all the participants tested.

The test is used for examining right brain responses because it is completely visual.

Norms established in a group testing with 103 college students (62 men and 41 women with an over-all mean age of 20.5 years), are mean 17.213 with a standard deviation of 7.32.

By the Kuder-Richardson formula, the reliability of the test as a whole was found to be .881.[3] Negligible gender differences were found. "In short, the test reveals relatively high reliability and discriminative capacity."[4]

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[1] A Factorial Study of Perception (Chicago: Univ. of Chicago Press, 1944), n.p.

[2] Ibid.

[3] Mooney, p. 14.

[4] Ibid., p. 15.

Appendix D

Psychological Screening Inventory

Psychological Screening Inventory

This paper and pencil instrument investigates a number of personal perceptions and feelings related to oneself. Areas investigated include: alienation, social non-conformity, discomfort, expression and defensiveness.[1] In addition to the myriad of data provided by the original author, Richard I. Lanyon, Ph.D., in his forty-two page manual, a great deal of experimentation and study has been done to expand the instruments' uses and capabilities. Expanded data will be described as they apply to this study.[2]

The PSI consists of 130 true/false items related to the individual.

The norms are based upon 500 males and 500 females. Norm raw score data are broken into the separate areas mentioned above: alienation, social non-conformity, discomfort, expression and defensiveness, represented in the table by initials. Each of these areas is measured by a scale or segment of the test. Table 8 also divides the group into genders. Means of those norms and standard deviations are shown on Table 8.

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[1] Richard I. Lanyon, Psychological Screening Inventory Manual, Harvard Medical School (Goshen, N.Y.: Research Psychologists Press, 1973), p. 3.

[2] Allan H. Frankle, "Sequential Response Shift Rate:

Table 8

PSI Means and Std. Deviations of Raw Scores for Normative Data

	Al	Sn	Di	Ex	De
Males Mean	5.742	8.872	8.770	12.576	10.628
S.D.	2.917	3.724	5.377	4.965	2.793
Female Means	5.952	6.538	11.086	10.638	11.662
S.D.	2.967	3.736	5.572	4.833	2.270

Scores used for this research were computed by a formula devised by Dr. Frankle in communication with Lanyon.

Reliability of the PSI based upon internal consistency of each scale (as listed above) was estimated by means of Kuder-Richardson Formula 20, using a group of one hundred undergraduate college students (fifty males and fifty females). The test re-test reliability coefficients were obtained by readministering after an average of ten days. They are shown in Table 9.[1]

A Correlate of Human Adaptivity Measurable with Existing Personality Inventories," Journal of Psychology, Oct. 1977.

[1] Lanyon, p. 18.

Table 9

Reliability Coefficients for PSI Scales

N	Al	Sn	Di	EX	DE
100	.62	.72	.85	.75	.51
54	.66	.95	.92	.88	.66
58	.73	.89	.75	.87	.76

Validity for the PSI is difficult to summarize because it is again divided into the separate areas mentioned above. In an experiment, however, with fifty-two persons who were to undergo major dental work at the University Clinic, the instrument was used to screen out those who might have psychological difficulty. In reference to their files it was found that sixteen of the eighteen identified by the PSI had psychological histories which bore out the PSI results.[1]

[1] Lanyon, p. 27.

Appendix E

Shipley Institute of Living Scale

Shipley Institute of Living Scale

This instrument has two parts which are distinctly separate; the vocabulary and the abstraction test. The raw score possibilities are forty for vocabulary and twenty for abstraction. Both tests are paper and pencil type, which are easily administered. The vocabulary portion is composed of multiple choice items, the abstraction portion is completion questions. The total and a quotient of the two scores called Conceptual Quotient are both used for various purposes. Some of these purposes including computing mental age and intellectual impairment. The scale as a whole is utilized for detecting mild degrees of intellectual impairment in individuals of normal original intelligence, or as a test of intelligence. In the case of this study the scale was used in the latter capacity, as an intelligence instrument. By analyzing the vocabulary segment or section in some cases or circumstances the left/right aspects of its components are separated.[1] In these instances it is used to measure left brain functioning.

The scale was standardized on 1,046 individuals. The realiability coefficients obtained from 322 army recruits were .87 for vocabulary test, .89 for the abstraction test,

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[1] W. C. Shipley, "A Self-Administering Scale for Measuring Intellectual Impairment and Deterioration," Journal of Psychology, 9 (1940), 371-77.

and .92 for the two combined. Validity coefficients are not available for normals but results obtained on 374 patients indicate the efficaciousness of the scale in measuring impairment.[1] (See Chapter Two, Right/Left Hemispheric Data and Neuropsychology.)

The following studies were suggested as sources concerning the test. Lubin, 1971; Aita, Armitage et al., 1947; J. W. Parker, 1957; Savage, 1970; Abbot et al., 1943; and Prado and Taub, 1966.[2]

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[1] W. C. Shipley, Institute of Living Scale for Measuring Intellectual Impairment, Manual of Directions and Scoring Key (Hartford, Conn.: The Institute of Living, n.d.), p. 2.

[2] Ibid.

Appendix F

Tennessee Self Concept Test

Tennessee Self Concept Scale

This scale was developed by the Tennessee Department of Mental Health. It evolved to meet a need for an instrument which was "simple for the subject, widely applicable, well standardized, and multi-dimensional."[1] It consists of one hundred self-descriptive statements which the subject uses to describe himself. It is applicable to the "whole range of psychological adjustment."[2]

Analysis of the instrument by the counselor or psychologist is easily accomplished because the test forms themselves produce, by means of carbons, a graph of the person's score in the various areas. Two scores which are vital parts of the results are P which stands for positive feelings and SC which in the case of this test stands for self-criticism.[3] These are the two scores examined in this research. With the help of Dr. Frankle, a correction factor was developed to adjust for what psychologists refer to as faking good or faking bad. This data is included in the Chapter Four description of self-concept factors and in Appendix N. The self-criticism factor was added back onto the raw score.

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[1] William H. Fitts, Tennessee Self Concept Scale Manual, Counselor Recordings and Tests (Nashville, Tenn.: n.p., n.d.).

[2] Ibid.

[3] Ibid., p. 2.

The TSCS was standardized on a broad sample of 626 persons. Many ages, educational levels, intelligence levels, and both genders were included in the sample. Ages were 12-78.

The manual explains that the distribution is extremely skewed for this varied sample. The Mean being 7.3, with about 68 percent scoring below the mean, on one item of the test.[1] Mean for P. (total positive) is 345.57 with a standard deviation of 30.70 and reliability of .92.

The manual presents a table of reliability factors broken into the various parts of the test.[2] In a study done by Congdon (1958)[3] he obtained a reliability coefficient of .88 for the total P.[4] "Other evidence of reliability is found in the remarkable similarity of profile patterns found through repeated measures of the same individuals over long periods of time. Through various types of profile analyses the author has demonstrated that the distinctive features of individual profiles are still present for most persons a year or more later."[5]

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[1] Ibid., p. 13.

[2] Ibid., p. 14.

[3] Ibid., p. 15.

[4] Ibid.

[5] Ibid.

Appendix G

The Trailmaking Test

The Trailmaking Test

The Trailmaking Test was originally a part of the Army Individual Test Battery (1944). It has been in wide use since that time as a test of visual conceptual and visuo-motor tracking.[1] The test is individually administered and timed, following specific directions in the test manual. It is in common usage today and is in the common domain, which means one can copy and use the test without express permission or without buying forms from the publisher.[2]

Since its origin it has undergone a number of changes in scoring and administering. The most common use of scoring techniques today is strictly a time factor. This is the technique used for the instrument in context of this study. The adaptation used in this study was written by Ralph M. Reitan, Ph.D., in 1958.[3] His manual for Administration, Scoring and Interpretation was used by this researcher.[4]

The test has two parts, Part A and Part B. Part A has twenty-five circles located on a white sheet of paper and

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[1] Lezak, p. 556.

[2] Ibid., 239

[3] Ralph M. Reitan, Trailmaking Test Manual for Administration and Interpretation, unpublished, Indiana University Medical Center, n.d.

[4] Ibid.

numbered randomly from one to twenty-five. The subject is required to connect the circles in numerical order as quickly as possible with a pencil line. This task is assumed to evaluate right brain response since the order of numbers is so much a part of adult knowledge that it is automatic to respond to the visual stimuli of joining the numbers. Part B has twenty-five circles as well with the numbers one through thirteen and the letters A to L. The subject in this case connects number, letter, number, letter in sequential order. The score, as mentioned, is the number of seconds required to complete each of these tasks. In speaking of Part B, Reitan says "This test would appear to require immediate recognition of the symbolic significance of numbers and letters, ability to scan the page continuously to identify the next number or letter in sequence, flexibility in integrating the numerical and alphabetical series, and completion of these requirements under the pressure of time."[1] For this reason test B is assumed to evaluate left brain orientation.

Norms were established on 284 persons. Eighty-four subjects without brain damage composed the control group and two hundred subjects with past or present evidence of

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[1] Reitan, p. 6.

brain damage, composed the experimental group.[1] "It is apparent that both Part B and Part A plus B discriminate rather well between groups."[2] In testing done by Lezak in 1982 she states:

> While the reliability of Part A, as measured by the coefficient of concordance, remained high throughout three administrations, 19 normal control subjects at six and twelve month intervals (W=.78), it was somewhat lower (W=.67) on form B (Lezak, 1982d).[3]

Lezak states further that significance was reached on the third administration (p/.001). She also states that average time scores on Part B did not drop significantly.[4]

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[1] Ibid.

[2] Ibid.

[3] Lezak, p. 557.

[4] Ibid.

Appendix H

Solicitation Form

Solicitation Form

Carol Fox Druart
2511 Sherwood Drive
Des Moines, IA 50310
(515) 279-6297

Art Teacher-Education Doctoral Candidate
Drake University
Past President, Art Educators of Ia.
Spokesperson/Author, Arts in Education
State Committee, Alliance for the Arts in Education
Governors Committee Arts for the Handicapped

Dissertation Topic Involves Importance of Arts in Education

I require volunteers from Dance, Visual Arts, Math and Law to be tested for use in my research
approximately 3 hour block for battery of tests (done on campus at time convenient to you) soliciting volunteers as subjects paper and pencil tests

Instruments to be utilized:
- Mooney Closure Test
- Hooper Visual Organization Test
- Conceptual Level Analogy Test
- Shipley Institute of Living Scale
- Trailmaking Test
- R. I. Lanyon, P.S.I.
- Tennessee Self-Concept Scale

Testing: Self Concept
R/L cerebral functioning
curricular involvement

WHATS IN IT FOR YOU?

An altruistic goal is that you can help in still another study to understand educational goals.

If you desire your test scores will be made available to you as well as the norms for the group and brief results of the study.

PLEASE HELP ME dates and times for testing are:

Memorial Hall Room # 210

Please call me if you sign up and cannot make the testing time you requested so that we can make alternate plans.

Appendix I

Sample Questionnaire

Sample Questionnaire

FOX-DRUART TEST CHECK OFF AND I.D. SHEET

	date taken	time start	time stop	total
Mooney Closure				
Hooper Visual				
C.L.A.T.				
Shipley				
Trailmaking				
P.S.I.				
Tennessee S.C.				

All participants must fill this out completely

Name_____ SS #_____

Home address_____
complete mailing

School address_____
complete mailing

Classification: fresh soph jr sr grad

Age: Sex: m f

Major or area of main interest or ability:

Which statement best fits you? 1 2 3

1. Do you find yourself involved with arts activities and courses to the exclusion of more fact related curriculum, except minimal or required?

2. Do you find yourself involved with fact related curriculum to the exclusion of arts activities and courses, except minimal or required?

3. Do you find your course work to be a balance of arts and fact related curriculum?

PLEASE FILL OUT COMPLETELY. THEN RECORD START AND STOP TIME FOR EACH TEST AFTER INSTRUCTIONS ARE READ AND YOU ACTUALLY BEGIN AND END.

Appendix J

Right / Left Cerebral Instruments Compared

Trailmaking A and Trailmaking B

with Difference Score

Table 10

Right / Left Cerebral Instruments Compared
Trailmaking A and Trailmaking B
with Difference Score
Art Sample

Code	Trailmaking A	Trailmaking B	Dif. Score
5732	32	48	-16
4391	22	48	-26
2465	40	73	-33
4300	22	38	-16
2291	30	60	-30
2604	35	68	-33
4199	27	65	-38
5464	28	53	-25
3038	32	55	-23
3821	27	38	-11
2371	43	62	-19
2910	49	83	-34
3412	28	55	-27
9251	29	42	-13
2713	30	70	-40
Means=	31.6	57.2	-25.6

Table 11

Right / Left Cerebral Instruments Compared
Trailmaking A and Trailmaking B
with Difference Score
Dance Sample

Code	Trailmaking A	Trailmaking B	Dif. Score
3032	61	115	-54
0976	50	67	-17
6461	39	65	-26
9225	34	45	-11
2502	38	60	-22
2186	80	94	-14
2128	35	32	-3
9182	75	65	-10
5902	65	61	-4
6948	33	97	-64
5956	33	72	-39
1986	73	66	-7
7021	51	50	+1
0227	29	63	-34
4960	59	96	-37
Means=	50.33	69.9	-18.73

Table 12

Right / Left Cerebral Instruments Compared
Trailmaking A and Trailmaking B
with Difference Score
Law Sample

Code	Trailmaking A	Trailmaking B	Dif. Score
0254	40	59	-19
5881	43	112	-69
4237	35	59	-24
1993	14	42	-28
7156	48	120	-72
9594	40	70	-30
2239	27	38	-11
*4077	42	100	-58
0130	27	62	-33
1070	22	38	-16
5766	25	54	-29
4815	19	32	-13
4175	33	61	-28
8548	28	65	-37
2112	38	67	-29
Means=	32.06	62.3	-31.73

* Subject eliminated for this instrument.

N = 14 for this instrument.

Table 13

Right / Left Cerebral Instruments Compared
Trailmaking A and Trailmaking B
with Difference Score
Math Sample

Code	Trailmaking A	Trailmaking B	Dif. Score
2424	27	54	-27
2996	43	82	-39
9295	30	55	-25
9378	38	65	-27
3312	22	47	-25
*8344	115	50	-65
2584	23	38	-15
0490	27	37	-10
2410	18	49	-31
6912	30	48	-18
3870	29	35	-6
1977	35	53	-18
2332	26	55	-29
3351	45	48	-3
7819	32	53	-21
Means=	27.49	51.4	-20.99

*Subject eliminated for this instrument.

N = 14 for this instrument.

Appendix K

A Comparison of Right Cerebral Instruments

Mooney and Hooper for Curricular Groups

Table 14

A Comparison of Right Cerebral Instruments
Mooney and Hooper for Curricular Groups
Art Sample

Code	Hooper Time	Hooper Correct	Hooper Ratio	Mooney Score	Mooney Time	Mooney Ratio
5732	3	27	9.00	30	22	1.36
4391	3	29	9.66	34	39	.87
2465	8	29	3.62	33	19	1.74
4300	4	29	7.25	27	34	.79
2291	2	29	14.50	32	37	.86
2604	4	28	7.00	31	24	1.08
4199	6	29	4.83	33	29	1.14
~~*5464~~	~~20~~	~~29~~	~~1.45~~	~~24~~	~~65~~	~~.37~~
3038	3	29	9.66	33	33	.88
3821	3	29	9.66	26	56	.48
2371	5	24	4.80	37	22	1.68
2910	2	29	14.50	33	24	1.38
3412	3	29	9.66	38	36	1.06
9251	4	27	6.75	37	24	1.54
2713	3	25	8.33	18	23	.78
Means=	3.78	28	8.51	31.57	30.14	1.12

* Subject eliminated for this instrument.

N = 14 for this instrument.

Table 15

A Comparison of Right Cerebral Instruments
Mooney and Hooper for Curricular Groups
Dance Sample

Code	Hooper Time	Hooper Correct	Hooper Ratio	Mooney Score	Mooney Time	Mooney Ratio
3032	6	28	4.66	26	20	1.30
0976	7	24	3.43	22	24	.92
6461	4	25	6.25	11	20	.55
~~*9225~~	~~20~~	~~25~~	~~1.25~~	~~24~~	~~50~~	~~.48~~
2502	4	25	6.25	26	24	1.08
2186	6	28	4.67	24	20	1.20
2128	4	27	6.75	36	32	1.13
9182	10	29	2.9	23	29	.79
5902	3	29	9.66	29	24	1.21
6948	5	29	5.8	19	20	.95
5956	7	27	3.86	24	24	1.00
1986	9	29	3.22	32	24	1.07
7021	6	26	4.33	38	25	1.52
0227	4	25	6.25	28	23	1.22
4960	3	29	9.66	31	23	1.55
Means=	5.57	27.14	5.55	26.36	23.71	1.10

* Subject eliminated for this instrument.

N = 14 for this instrument.

Table 16

A Comparison of Right Cerebral Instruments
Mooney and Hooper for Curricular Groups
Law Sample

Code	Hooper Time	Hooper Correct	Hooper Ratio	Mooney Score	Mooney Time	Mooney Ratio
0254	11	27	2.45	29	53	.55
5881	6	27	4.50	42	69	.61
4237	6	27	4.50	33	28	1.18
1993	4	29	7.25	29	35	.83
7156	3	26	8.66	33	38	.87
9594	4	29	7.25	29	42	.69
2239	3	26	8.66	12	28	.43
4077	5	27	5.40	37	32	1.16
0130	6	26	4.30	37	26	1.42
1070	4	29	7.25	30	37	.81
5766	5	29	5.80	26	30	.87
4815	3	28	9.33	23	36	.64
4175	5	28	5.60	37	53	.70
8548	3	29	9.66	28	20	1.40
2112	10	28	2.80	29	70	.41
Means=	5.2	27.67	6.22	30.27	37.66	.84

Table 17

A Comparison of Right Cerebral Instruments
Mooney and Hooper for Curricular Groups
Math Sample

Code	Hooper Time	Hooper Correct	Hooper Ratio	Mooney Score	Mooney Time	Mooney Ratio
2424	8	26	3.25	26	16	1.63
2996	2	27	3.86	29	60	.48
9295	5	28	5.60	28	30	.93
9378	3	23	7.67	14	17	.82
3312	5	28	5.60	31	30	1.03
8344	4	28	7.00	26	23	1.13
2584	7	29	4.14	21	61	.34
0490	4	30	7.50	31	33	.94
2410	4	30	7.50	33	29	1.14
6912	4	26	6.50	30	35	1.06
3870	5	28	5.60	32	35	.91
1977	5	28	5.60	29	30	.97
2332	4	29	7.25	24	32	.75
3351	6	29	4.83	30	37	.81
7819	4	27	6.75	22	31	.71
Means=	4.67	27.73	5.97	27.26	33.27	.91

Appendix L

Conceptual Level Analogy Test

Arriving At a Score/Time

in Minutes Ratio

Table 18

Conceptual Level Analogy Test Arriving
At a Score/Time in Minutes Ratio
Dance Sample

Code	Number Correct	Time in Minutes	Clat Ratio Correct/Time
3032	33	9	3.6
0976	34	11	3.0
6461	36	20	1.8
9225	32	15	2.0
2503	23	6	3.8
2186	23	10	2.3
2128	29	6	4.8
9182	31	12	2.58
5902	35	11	3.0
6948	30	12	2.5
5956	29	10	2.9
1986	35	13	2.69
7021	31	10	3.1
0227	28	18	1.55
4960	32	9	3.55
Means=	30.73	11.46	2.88

S =0.868

Table 19

Conceptual Level Analogy Test Arriving
At a Score/Time in Minutes Ratio
Math Sample

Code	Number Correct	Time in Minutes	Clat Ratio Correct/Time
2424	27	7	3.85
2996	31	9	3.0
9295	26	15	1.7
9378	18	8	2.25
3312	26	10	2.6
8344	32	12	2.6
2584	30	16	1.87
0490	30	12	2.5
2410	31	11	2.8
6912	33	10	3.3
3870	25	14	1.78
1977	30	15	2.0
2332	33	10	3.3
3351	34	7	4.85
7189	30	19	1.57
Means=	29.06	11.66	2.66

S = 0.868

Table 20

Conceptual Level Analogy Test Arriving
At a Score/Time in Minutes Ratio
Law Sample

Code	Number Correct	Time in Minutes	Clat Ratio Correct/Time
0254	33	18	1.8
5881	33	14	2.35
4237	31	6	5.0
1993	32	13	2.46
7156	32	21	1.5
9594	30	11	2.7
2239	32	8	4.0
4077	30	10	3.0
0130	29	12	2.4
1070	33	7	4.7
5766	42	10	4.2
4815	30	8	3.75
4175	32	15	2.1
8548	26	6	4.0
2112	31	15	2.0
Means=	31.73	13.7	3.07

S = 1.08

Table 21

Conceptual Level Analogy Test Arriving
At a Score/Time in Minutes Ratio
Art Sample

Code	Number Correct	Time in Minutes	Clat Ratio Correct/Time
5732	27	10	2.7
4391	31	13	2.38
2465	27	8	3.37
4300	31	8	3.87
2291	31	9	3.4
2604	32	11	2.9
4199	33	11	3.0
5464	29	11	2.6
3038	27	20	1.35
5821	33	7	4.7
2371	27	7	3.85
2715	25	8	3.1
2910	30	13	2.3
3412	34	12	2.8
9251	32	14	2.28
Means=	29.93	10.93	2.97

S = .792

Table 22

Establishing the Right/Left Cerebral Dominance Difference
Art Sample

Code	Mooney Ratio	Sq.Rt. of No. Corr./Time	Mooney Z	Shipley Raw	Shipley Voc. Z	Right/Left +/- Cer.Dom.Diff.
5732	1.36	.249	1.19	32	-.30	+1.49
4391	.87	.150	-.57	29	-1.19	+.62
2465	1.74	.302	2.12	29	-1.19	+3.31
4300	.79	.153	-.51	32	-.30	+.21
2291	.86	.153	-.51	28	-1.49	+.98
2604	1.08	.212	+.53	32	-.30	+.83
4199	1.14	.198	+.28	34	+.29	-.01
~~*5464~~	~~.37~~	~~.075~~	~~1.89~~	~~34~~	~~+.29~~	~~-2.18~~
3038	.88	.163	-.34	30	-.89	+.55
3821	.48	.093	-1.57	33	-.01	-1.56
2371	1.68	.276	+1.66	29	-1.19	+2.85
2713	.78	.184	+.04	23	-2.97	+1.82
2910	1.38	.239	+1.01	27	-1.78	+.13
3412	1.06	.171	-.19	36	+.88	-1.66
9251	1.54	.253	+1.26	38	+1.47	-1.71

* Subject eliminated for this instrument.

N = 14

Left Dominant = 4

Right Dominant = 10

Appendix M

Establishing a Right/Left Cerebral Dominance Difference Score

Table 23

Establishing the Right/Left Cerebral Dominance Difference
Dance Sample

Code	Mooney Ratio	Sq.Rt. or No. Corr./Time	Mooney Z	Shipley Raw	Shipley Voc. Z	Right/Left +/- Cer.Dom.Diff.
3032	1.30	.255	+1.29	35	+.59	+.70
0976	.92	.195	+.23	32	-.30	+.53
6461	.55	.166	-.28	36	+.88	-1.16
~~*9225~~	~~.48~~	~~.098~~	~~-1.49~~	~~33~~	~~-.01~~	~~-1.48~~
2502	1.08	.212	+.53	29	-1.19	+1.72
2186	1.20	.245	+1.12	29	-1.19	+1.31
2128	1.13	.188	+.11	32	-.30	+.41
9182	.79	.165	-.30	32	-.30	.00
5902	1.21	.224	+.74	33	-.01	+.75
6948	.95	.218	+.64	36	+.88	-.24
5956	1.00	.204	+.39	26	-2.08	+2.47
1986	1.33	.236	+.96	36	+.88	+.08
7021	1.52	.247	+1.15	37	+1.18	-.03
0227	1.22	.230	+.85	40	+2.07	-1.22
4960	1.35	.242	+1.06	32	-.30	+1.36

* Subject eliminated for this instrument.

N = 14

Left Dominant = 4

Right Dominant = 10

Table 24

Establishing the Right/Left Cerebral Dominance Difference
Law Sample

Code	Mooney Ratio	Sq.Rt. or No. Corr./Time	Mooney Z	Shipley Raw	Shipley Voc. Z	Right/Left +/- Cer.Dom.Diff.
0254	.55	.102	-1.42	33	+.01	-1.43
5881	.61	.094	-1.56	31	-.60	-.96
4237	1.18	.205	+.41	37	+1.18	-.77
1993	.83	.154	-.50	36	+.88	-1.38
7156	.87	.151	-.55	38	+1.47	-2.02
9594	.69	.128	-.96	38	+1.47	-2.43
2239	.43	.124	-1.02	35	+.59	-1.61
4077	1.16	.190	+.14	38	+1.47	-1.33
0130	1.42	.254	+.92	30	+1.77	-.85
1070	.81	.148	-.60	34	+.29	-.89
5766	.87	.170	-.21	32	-.30	+.09
4815	.64	.133	-.87	31	-.60	-.27
4175	.70	.115	-1.19	35	+.59	-1.78
8548	1.40	.265	+1.47	36	+.88	+.59
2112	.41	.077	-1.86	34	+.29	-2.15

N = 15

Left Dominant = 13

Neutral = 1

Right Dominant = 1

Table 25

Establishing the Right/Left Cerebral Dominance Difference
Math Sample

Code	Mooney Ratio	Sq.Rt. or No. Corr./Time	Mooney Z	Shipley Raw	Shipley Voc. Z	Right/Left +/- Cer.Dom.Diff.
2424	1.63	.319	+2.42	33	-.01	+2.43
2996	.48	.090	-1.63	33	-.01	-1.62
9295	.93	.196	-.11	33	-.01	-.10
9378	.82	.220	+.67	15	omit	omit
3312	1.03	.186	+.07	33	-.01	+.08
8344	1.13	.222	+.71	33	-.01	+.72
2584	.34	.075	-1.89	32	-.30	-1.59
0490	.94	.169	-.23	28	-1.49	+1.26
2410	1.14	.198	+.28	32	-.30	+.58
6912	1.06	.174	-.14	36	-.88	-1.02
3870	.91	.162	-.35	31	-.61	+.26
1977	.97	.180	-.04	31	-.61	+.57
2332	.75	.153	-.51	32	-.30	-.21
3351	.81	.148	-.61	38	+1.49	-2.09
7819	.71	.151	-.55	32	-.30	-.25

N = 14

Left Dominant = 7

Right Dominant = 7

Appendix N

Curricular Areas Compared by Self Concept Instruments PSI and Tennessee Self Concept

Table 26

Curricular Areas Compared by Self Concept Instruments PSI and Tennessee Self Concept
Art Sample

Code	Tenn. Raw Score	Tenn. SC Correction	Corrected Tenn.	PSI Raw	PSI Correction	Corrected PSI
5732	187	86	273	84	30	114
4391	317	70	387	26	36	62
2465	296	78	374	34	48	82
4300	385	58	443	8	69	77
2291	329	74	403	59	24	83
2604	332	60	392	40	48	88
4199	359	74	433	49	48	97
5464	372	80	452	39	36	75
3038	299	88	387	73	27	100
3821	374	90	464	45	30	75
2371	354	110	464	24	54	78
2910	295	74	369	61	63	124
3412	387	96	483	48	54	102
9251	339	64	403	38	27	65
2713	328	78	406	59	27	86
Means=	330.2	78.67	408.9	46.63		87.20*

* For PSI instrument only highest score means most maladjusted.

Table 27

Curricular Areas Compared by Self Concept Instruments
PSI and Tennessee Self Concept
Dance Sample

Code	Tenn. Raw Score	Tenn. SC Correction	Corrected Tenn.	PSI Raw	PSI Correction	Corrected PSI
3032	363	66	429	30	63	93
0976	390	64	454	10	57	67
6461	323	47	370	67	33	100
9225	293	72	365	82	36	118
2502	364	60	424	43	33	76
2186	411	56	467	27	48	75
2128	375	76	451	30	66	96
9182	322	70	392	15	60	75
5902	378	84	462	40	48	88
6948	290	88	378	47	21	68
5956	372	62	434	33	15	78
1986	311	82	393	53	30	83
7021	343	68	411	35	51	86
0227	382	74	456	27	69	96
4960	366	68	434	45	30	75
Means=	352.2	69.1	421.3	38.93		84.93*

* For PSI instrument only highest score means most maladjusted.

Table 28

Curricular Areas Compared by Self Concept Instruments PSI and Tennessee Self Concept Law Sample

Code	Tenn. Raw Score	Tenn. SC Correction	Corrected Tenn.	PSI Raw	PSI Correction	Corrected PSI
0254	370	54	424	4	69	92
5881	345	72	417	38	60	98
4237	360	84	444	33	36	69
1993	360	98	458	55	42	97
7156	324	31	355	18	63	81
9594	299	66	365	46	21	67
2239	372	74	446	30	81	111
4077	378	80	458	13	48	61
0130	368	86	454	26	21	47
1070	343	88	431	45	51	96
5766	336	70	400	19	60	79
4815	354	82	436	59	27	86
4175	370	88	458	25	66	91
8548	354	76	430	52	52	109
2112	360	84	444	48	39	87
Means=	352.9	75.5	434.1	34.07		84.73*

* For PSI instrument only highest score means most maladjusted.

Table 29

Curricular Areas Compared by Self Concept Instruments
PSI and Tennessee Self Concept
Math Sample

Code	Tenn. Raw Score	Tenn. SC Correction	Corrected Tenn.	PSI Raw	PSI Correction	Corrected PSI
2424	361	56	417	43	48	91
2996	294	66	360	34	30	64
9295	327	80	407	43	48	91
9378	359	50	409	44	45	89
3312	342	82	424	74	21	95
8344	322	84	406	35	51	86
2584	416	54	470	37	39	76
0490	392	76	468	24	48	72
2410	321	90	418	50	27	77
6912	354	60	414	42	42	84
3870	362	40	402	32	63	95
1977	357	86	443	39	27	66
2332	321	72	393	39	42	81
3351	319	82	401	35	15	50
7819	326	80	406	44	48	92
Means=	345.3	66.9	415.87	41.00		80.60*

* For PSI instrument only highest score means most maladjusted.

Appendix O

Conceptual Level Analogy Test

Lackland Norms

Table 30

Conceptual Level Analogy Test
Lackland Norms

Scaled Score	Scaled Score Equivalents of Raw Score				Scaled Score
	CLAT	WSA	WUMV	WAIS-VOC.	
20	42	--	--	--	20
19	40-41	--	--	80	19
18	38-39	40	--	75-79	18
17	36-37	38-39	42	71-74	17
16	34-35	35-37	39-41	67-70	16
15	32-33	33-34	36-38	63-66	15
14	30-31	31-32	33-35	59-62	14
13	29	29-30	30-32	55-58	13
12	27-28	27-28	27-29	50-54	12
11	25-26	25-26	25-26	46-49	11
10	23-24	22-24	22-24	42-45	10
9	21-22	20-21	19-21	38-41	9
8	19-20	18-19	16-18	34-37	8
7	17-18	16-17	13-15	30-33	7
6	15-16	14-15	10-12	25-29	6
5	13-14	12-13	7- 9	21-24	5
4	12	10-11	4- 6	17-20	4
3	10-11	7- 9	1- 3	13-16	3
2	8- 9	5- 6	0	9-12	2
1	6- 7	3- 4	--	5- 8	1
0	0- 5	0- 2	--	0- 4	0

Source: Allen Willner, Conceptual Level Analogy Test, Key and Norms, 1971 (unpublished).

Appendix P

Sample Data

Table 31

Sample Data

Gender of Sample		
Curricular Involvement	Male	Female
Art	6	9
Math	9	6
Dance	2	13
Law	8	7
	25	35

Table 32

Sample Data

Gender Totals		
	Male	Female
Arts Oriented Curriculum Totals	8	22
Fact Oriented Curriculum Totals	17	13
	25	35

Table 33

Sample Data

Ages of Sample			
Curricular Involvement	Mean	Median	Mode
Art	20		
Math	20.8		
Dance	21.3		
Law	24.1		

Table 34

Current Curricular Balance
as Perceived by Sample

Major Curricular Pursuit	Choice 1 Arts Or.*	Choice 2 Fact Or.*	Choice 3 Bal. Cur.*
Art	10	0	5
Dance	4	0	11
Law	0	10	5
Math	1	10	4
	15	20	25

* See Questionnaire Appendix I., Samples choose the statement which they feel best describes their curricular balance at the time. Their choices are: Arts Oriented, Fact Oriented and Balanced.

Appendix Q

Fifteen Right and Left Cerebral Dominant Persons Examined for PSI and Tennessee Self Concept Scores

Table 35

Fifteen Highest Right Cerebral Dominant Persons Examined for PSI and Tennessee Self Concept Scores

+Score	Code	PSI Corr. SC	Tennessee Corr. SC
+3.47	2465	82	374
+2.99	2910	124	369
+2.40	2713	86	406
+1.99	5956	78	434
+1.97	2424	91	417
+1.87	2186	75	467
+1.51	2502	76	424
+1.45	5732	114	273
+1.42	4960	75	434
+1.16	2291	83	403
+.91	2371	78	464
+.89	4391	62	387
+.80	2410	77	418
+.72	5902	88	462
+1.50		85.66*	412.2 Means

* For PSI instrument only highest score means most maladjusted.

N = 15 = 4 males, 11 females = 7 Art, 6 Dance, 2 Math, 0 Law

Table 36

Fifteen Highest Left Cerebral Dominant Persons Examined for PSI and Tennessee Self Concept Scores

-Score	Code	PSI Corr. SC	Tennessee Corr. SC
-2.30	9594	67	365
-2.20	2239	111	446
-2.13	6461	100	370
-2.07	5464	75	452
-1.97	3351	50	401
-1.95	2112	87	444
-1.77	7156	81	355
-1.57	2584	76	470
-1.45	9225	118	365
-1.45	2996	64	360
-1.45	3821	75	464
-1.39	4175	91	458
-1.33	0227	96	456
-1.30	1993	97	458
-1.24	0254	92	424
-1.70		85.33*	419.2 Means

* For PSI instrument only highest score means most maladjusted

N = 15 = 5 males, 10 females = 7 Law, 3 Dance, 3 Math, 2 Art